

III.—*On certain protracted Irregularities of Atmospheric Pressure in the Indian Monsoon-region, and their Relation to Variations of the Local Rainfall.*—By HENRY F. BLANFORD, F. G. S.

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*Note.*—The greater part of the following paper was written in 1874 for communication to the British Association meeting at Belfast, and an abstract of the paper appears in the Reports of the work of Section A for that year. I did not, however, publish the paper in extenso, as I desired before doing so to verify the conclusions by some further experience. The original paper discussed the phenomena of the years 1868, 1871, 1872, and 1873 : I have now added those of 1869, 1870, and 1874 ; and I have redrawn the tables of the former years, substituting as the standard of comparison, the averages obtained up to the end of 1874, for those up to the end of 1873 only. The result has been a further confirmation of at least one of my conclusions, *viz.* the persistency of certain anomalies of pressure distribution. The other conclusion suggested, *viz.* that the rainfall of each season is influenced in a characteristic manner by these anomalous variations of the pressure, is one that requires for its verification a far more detailed and prolonged study than the data here given will admit of.

In a paper read in February 1874 before the Royal Society, I concluded from a detailed discussion of the wind-directions, and the distribution of atmospheric pressure in Northern and Central India, as well as of other meteorological elements, that the Indian branches of the two monsoons, in the one case originate, in the other terminate south of the Himalaya ; and that they are but little, if at all, dependent on the variations of atmospheric pressure in Central Asia, to which they have generally been attributed. The great mountain chain acts in fact as a complete barrier to the lower half of the atmosphere, and it was shewn that it is within this stratum that the alternating air-currents are restricted. From April to the end of September an area of low pressure exists over a part of Central India and the Punjab, towards which a tolerably steady current blows from equatorial seas ; while, during the remainder of the year, there is an area of less intense maximum pressure in approximately the same region, in which the winter or NE monsoon originates. In the charts given in illustration of this paper, it was shewn that the position of the barometric minimum in the SW monsoon, on an average, changes but little from the month of May, before the rains set in, up to the end of the rains in September or October ; when the pressure becomes nearly uniform, prior to the re-distribution which characterises the winter season. The object of the present paper is to shew that while

the distribution of relative pressures during the SW monsoon deviates somewhat from the normal or average type in certain years, the variations which appear at the beginning of the season in April or May are almost, if not quite, as persistent as the normal features of distribution shewn in the charts; and sometimes, indeed, last through one or two years. This fact is one which may prove hereafter of much practical importance. Since the strength and direction of the winds are determined by differences of pressure in neighbouring regions, and since the monsoon rains are in their turn dependent on the vapour-bearing winds, it might be expected that the anomalies of rainfall would also shew a certain persistence, and that each season, and, in certain cases, two seasons in succession, would preserve much the same character in regard to the excess or deficiency of rainfall. As far as observation hitherto has afforded the means of testing this presumption, this appears to be actually the case; the result being sometimes a succession of destructive floods, at other times the failure of the late autumn crops over large areas, producing those famines for which India is disastrously notorious.

Until about eight years ago there were no systematic records of meteorological phenomena in India, sufficiently general for instituting an enquiry into a question of this kind: and even up to last year, those that are trustworthy and at the same time accessible, related only to about a third of the whole area of India. It is therefore for this portion only that evidence is at present forthcoming. But fortunately this includes the greater part of the area which is concerned with that branch of the monsoon that traverses the Bay of Bengal in the summer months; the remainder being chiefly watered either by the current which proceeds from the western coast; or, in the case of the Carnatic, by the Bay of Bengal current which is deflected towards that region in October and November.

With such partial data as have hitherto been available, it is certainly not possible to establish definite laws of the relations between the quantity and distribution of the rainfall on the one hand, and local irregularities in the distribution of pressure on the other. To do this effectually will require much more complete data than we at present possess; including a knowledge of the distribution of atmospheric pressure over the whole of India and the neighbouring seas;\* and more perfect means of determining the absolute movement of the air,† its temperature and humidity, than are at present available. I shall therefore content myself in this place with

\* This, it is hoped, will be shewn for the first time in the Report on the Meteorology of India for 1875, by means of isobaric and wind-charts for each month of the year.

† Steps have been taken to procure self-recording anemometers for this purpose, which will be erected at some 20 stations in addition to the three presidency capitals; which are already provided with them.

adducing evidence to shew that abnormal variations of relative pressure tend to be persistent ; and on the former head I shall only point out some observed coincidences, with the caution that no satisfactory discussion of this subject is practicable until the conditions are known over a very much wider area than that treated in the present paper, and that for a sufficiently long period.

When the barometric traces of a number of stations in different parts of India are compared together, it appears that, after eliminating the regular variation of the daily tides, they are all affected simultaneously or nearly so by irregular fluctuations of very various duration (from one to many days), and that these are on the whole more intense at northerly than at southerly stations. The amount by which the pressure at any place for a given month or day deviates above or below its normal value for that period, will necessarily be affected by these irregular fluctuations as well as by those protracted anomalies of pressure with which I am now concerned. The most ready way of exhibiting the latter is to take the barometric difference for the period in question of a pair of stations, not too distant from each other, and from this to deduct their normal or average difference for the corresponding period ; or, what comes to the same thing, to obtain the total barometric anomaly\* for each of the pair separately, by deducting the corresponding normal values, and then to take the difference of these anomalies. This latter method will be followed in the tables illustrating this paper. If we find that as a general rule these final differences or, as I have termed them, *relative anomalies* preserve the same sign + or — and not infrequently approximately similar values for many months together (the comparison being sufficiently extensive fairly to test the whole mass of the data), the proposition that abnormal variations of relative pressure tend to be protracted, may be considered as established. I must, however, remark by way of precaution, that the above method of proceeding does not completely eliminate the general irregular fluctuations. It would do so, only if all stations were equally affected by them ; but actually this is not the case. A simple inspection of the barometric curves (of which I have a series for several years) shews that, as a rule, these fluctuations are more intense, the higher the latitude ; and that, sometimes, stations in the interior seem to be more affected than those on the coast. Hence the further two stations are apart (especially in latitude), the less complete is the elimination. But for my present purpose this rough method will suffice. I now proceed to the facts.

In 1868 an abnormal barometric depression in the NW corner of the Bay of Bengal and in part of Orissa characterised the whole of the SW

\* By this term, I designate the amount by which the mean pressure at any station for a given day, month, or year, ranges above or below the corresponding average of many years.

monsoon, while in Lower Bengal the pressure was for the most part above the average. This is shewn in the tables for the year [*see Appendix*]; the first of which gives the mean total barometric anomaly for each month of Calcutta, Saugor Island, False Point, Cuttack, Chittagong, and Akyab, and the second the relative anomalies for certain pairs of stations selected so as best to illustrate the phenomenon in question.

In this case, which indeed was the first that attracted my attention, the relative depression was remarkably intense, and bounded (on the land side at least) by a high gradient. The pressure in Bengal was unusually high and that at False Point abnormally low at the beginning of the year; and this barometric difference was intensified in May, when, however, there was a prevalent high pressure much exceeding the average. In June, again, when the general pressure was below the average, the difference was less, and as between the neighbouring stations of Cuttack (50 miles from False Point) and Calcutta, almost disappeared; reappearing, however, in July with a general excess of pressure, and becoming further intensified in August with a general and abnormal fall. In this last month the greatest difference was between Saugor Island and Calcutta (68 miles apart); amounting absolutely to not less than  $\cdot 103$  inches on the mean pressures of the month. There was no cyclone, notwithstanding that so great a barometric gradient rarely occurs, even temporarily in India, except during the passage of a cyclone. The rainfall at Calcutta during the month was however very heavy, one half greater than at Saugor Island, and at Hooghly 30 miles further north it was nearly twice as great as at Calcutta. I shall recur to this subject in the sequel. In the north-west of the Bay, the anomalous depression lasted until the end of the year; but it was most intense during the south-west monsoon. The excessive rainfall was quite local, and occurred, as we have seen, some distance to the north of the depression. In the N. W. Provinces the fall of the season was somewhat deficient.

In 1869 the pressure was abnormally high at False Point and Cuttack (especially the former), relatively to the more southern part of the coast (Madras) on the one hand, and to Bengal, especially as represented by Berhampore on the other. It was abnormally low at Berhampore and also at Chittagong; while at Akyab, relatively both to this place and Port Blair, and during the greater part of the monsoon, even to False Point, it was unusually high; August being a temporary exception. In other words, there seems to have been an abnormal ridge of high pressure, extending across the Bay from Akyab to False Point and Cuttack. In the Meteorological Report for that year it is stated that "the rainfall was less than the average in Orissa, the Gangetic delta, and Aracan. Also in Eastern Bengal (except Sylhet and Cherrapunji), in Lower Assam, Sikkim, and parts of Behar. It was above the average at Soory and Berhampore, and over a

tract of country stretching between the Rajmahal hills and the Bhotan dwars, including Dinajpur, Rangpur and probably Julpigori and Buxa." Hence it appears that the ridge of relatively high pressure, before adverted to, had the effect of diminishing the rainfall generally both in the region occupied by it and also to the north; except where the abnormal depression at Berhampore and Chittagong tended to negative this effect and produce a local increase. Quoting again from the Report of the year, "it would appear that the area of greatest rainfall did not coincide with that of the barometric depression but was at 150 miles to the north-east of it. It was very restricted, and if the data can be trusted in detail would seem to be sharply defined."

The local relative excess of pressure at False Point and Cuttack was maintained through the cold weather of 1869—70, and up to the end of the latter year; except at Cuttack, where it fell in December. The same was the case at Akyab, except temporarily in the month of May [*see* Tables]. Its total duration extended therefore over two entire years. At False Point, however, the barometer stood abnormally in excess of Akyab, during the earlier months of the year and also in August and December. The region of most persistent depression was about the Andamans,\* and the relative depression at Chittagong, Berhampore, and Monghyr was maintained, though less intense than in the previous year. At Jubbulpore the pressure was abnormally high, relatively to Nagpur, during the hot weather; but this relation was reversed in August, and at the end of the year, the pressure at the latter station ranged greatly above that at the former.

In the Bengal Report for this year it is stated that "In the Central Provinces, including Sambhalpur and the hilly country to the West of the Gangetic delta, the rainfall was higher than usual; while the Orissa coast tract and the Gangetic delta had less than the average, more especially along a line passing through False Point, Midnapur, and Burdwan", that is to say under the lea of the high pressure region about False Point. "The stations in Behar registered about the usual quantity; in some cases much more;" this being under the lea of the relative depression about Monghyr. "In Eastern Bengal and Arakan the rains were generally somewhat deficient, except at Sylhet and Noakhally"; and it is observed that "some of these local irregularities appear to be very anomalous."

I next come to the year 1871, one of unusually heavy rainfall in Bengal (except the Eastern districts and Lower Assam) and also in the NW Provinces and Central India. In this year, the pressure was abnormally low in the eastern part of the Bay about Akyab, in Orissa, and in Central India north of the Sâtpúra range; as compared with Bengal, the Gangetic valley, and the tract to the South of the Sâtpúras. On the west coast (the In-

\* In January a cyclone occurred in the extreme South of the Bay.

dian coast) of the Bay, especially about False Point, the pressure was still relatively high, so that the two areas of abnormally low pressure, *viz.* that on the East of the Bay and that of Orissa, were distinct and separated. The Akyab depression did not extend to Port Blair (Andamans), where the pressure was on the whole slightly in excess of the average. To shew these differences, in the Table for 1871 I have compared in the same manner as before, Akyab with Chittagong on the north and Port Blair on the south; False Point with Vizagapatam, and this with Madras on the south and with Berhampore on the north; also with Akyab on the east and Cuttack on the west; Cuttack with Berhampore, Monghyr, and Jubbulpore; and Jubbulpore with Benares on the north and Nagpore on the south. Also Berhampur with Monghyr and Chittagong.

The general persistency of the relative baric anomalies of the season is well shewn in the table. But it exhibits some interruptions; as for instance a sudden relative depression at False Point, Vizagapatam, and Cuttack in June, coinciding indeed with a general fall below the average, but most intense at those stations. The rainfall in this month was exceptionally heavy in the Gangetic delta, especially in the neighbourhood of Calcutta, where it was about twice as great as at Saugor Island; thus repeating the conditions already noticed in 1868. Another noticeable interruption is a rapid rise of pressure at Jubbulpore in October, which was partially felt at Nagpore and Benares, but not at all in Orissa; while in Lower Bengal there was a fall of pressure. Fluctuations in the amounts of the relative anomalies, of less magnitude are indicated throughout, as might indeed be expected; but they are for the most part gradual and not such as to negative the general truth of the law of persistency.

The next year, 1872, was one of light rainfall in Bengal generally (that of every month being below the average); but it was excessive in Orissa and Chutia Nagpore. It was also stormy in the Bay of Bengal, which was not the case in 1871. In the N. Western and Central Provinces the rainfall was either about the average or somewhat above it; this was chiefly due to the heavier fall of the later months of the monsoon. Both in the N. W. Provinces and Behar, the hot weather months with June and July were generally dry, and rain did not fall plentifully till August. The anomalous barometric depression in the neighbourhood of Akyab, and in Orissa as compared with stations to the North was greater than in 1871; but Akyab did not on the whole range abnormally below Port Blair, nor did Jubbulpore range unusually below Nagpore on the one hand and Benares on the other, as in the previous year; while an abnormal depression in the N. West of the Bay connected the Orissa and Akyab depressions, being greatest about False Point, or possibly in the neighbouring part of the Bay. To shew this distribution I give tables for the same stations as in the previous year,

with the addition of Agra, Jhansi, and Lucknow in the N. W. Provinces, these latter being chiefly for comparison with the corresponding data of 1873, when there was an important barometric irregularity in the Upper Provinces.

In the table the general persistency of the baric anomalies is clearly shewn, but there are three interruptions of some importance. In May with a general fall greater than the average, especially in Central India and False Point, Jhansi in the interior and Port Blair were exceptions, the fall there being slightly less than the average. Again, in June, when the pressure generally was considerably above the average, Orissa and Port Blair changed in the opposite direction. Lastly, in September, with an unusual rise of pressure every where, this was most intense at False Point and Jubbulpore, and was but little in excess of the average at Port Blair, Vizagapatam, and Madras.

I now come to the year 1873, the rainfall of which in most parts of Northern India was much below that even of the previous year, causing that deficiency of the crops in parts of Bengal and the N. W. Provinces which is still fresh in the recollection of all. The baric anomalies of the year were in some respects identical with those of 1872, having lasted through all the revolutions of the changing monsoons, but they were accompanied by others which made their appearance either in the latter part of that year or the earlier months of 1873, thus rendering the barometric distribution in the summer monsoon more anomalous than that of any year yet recorded.

The anomalous depression in the Northern part of the Bay of Bengal and Orissa still continued: Akyab as compared with Chittagong and False Point as compared with Vizagapatam and Madras were lower even than in 1872: and the Orissa depression, relatively to Bengal and the Central Provinces, was as great, in some cases greater than in the previous year. With regard to the south-east of the Bay, as represented by Port Blair, the Akyab depression was somewhat greater than in 1872, but the registers of a station, established during the year, in the Nicobars, seem to shew that to the south of the Andamans there existed a very considerable barometric depression, which must have greatly influenced the strength of the monsoon in the Bay of Bengal, and which was probably abnormal, though in the absence of earlier registers, this cannot be confidently asserted.

In the upper part of the Ganges valley, in the province of Oude, a very unusual depression appeared in the later months of 1872 and lasted up to the close of the monsoon of 1873. These facts are shewn in the tables for the year at the end of this paper.

As in the previous years, the tables shew a general persistence of the relative anomalies, with some interruptions, traceable to the unequal incidence of general temporary fluctuations. Thus, in February, when the

pressure generally became about normal after an unusual depression in January, the change affected the several stations very unequally, Orissa and the upper part of the N. W. Provinces being most affected, and Jubbulpore and Madras the least. In May, again, the pressure fell much less than usual as a general rule, but at Akyab the fall was of the almost normal amount; while at Agra and Lucknow it was less than the average fall by nearly 0·1 inch. In June the fall of pressure was everywhere greater than the average, the excess being greatest at Agra and Lucknow, and least at Akyab, Madras, and Nagpore. Lastly, in August, with a general abnormal rise of pressure, Akyab, Chittagong, Berhampur, and Monghyr show the greatest excess, and Agra and Lucknow nearly as much, but the rise at Madras was not much greater than the average, and at Port Blair, Vizagapatam, and Nagpore about equal and of intermediate amount.

In 1874 the pressure was abnormally low relatively to other places at Akyab, False Point, and Cuttack, especially the last; while it was highest at Berhampur and Chittagong.

Agra and Lucknow (especially the last) shewed a low pressure as in the preceding year; but the depression was relatively less intense; and Jhansi and Jubbulpore were relatively high, more especially the latter. The persistency of these differences was not less than in former years, as may be seen in the table for 1874; but I have not been able to trace out any such concurrence between these phenomena and the peculiarities of the rainfall as are exhibited in the reports and registers of certain previous years. The rainfall of 1874 was generally deficient in the western districts of Bengal and also the more eastern districts and Arakan; but above the average at Burdwan, Soory, Contai, and in the Rajshaye and Cooch Behar divisions. In general, too, it was in excess in Behar, Chutia Nagpur, and Orissa. In the N. W. and Central Provinces also it was generally abundant; Jhansi, Ajmere, and Nagpore being, however, exceptions. In the earlier part of the monsoon, the rain was plentiful in the N. W. Provinces and scanty in Bengal. In September and October this relation was reversed.

Lest the somewhat abstract language I have employed in describing these phenomena should tend to obscure the physical facts to which the tables testify, it will be useful, before proceeding further, to recall to mind what these facts really are. Such expressions as *normal* and *abnormal*, however convenient for describing the mental analysis of a phenomenon which results from the concurrent operation of a number of causes, have really reference only to our way of regarding it, and none whatever (of necessity) to the phenomenon itself. The physical facts educed in the foregoing discussion may be thus enunciated:—That amid the never ceasing changes of condition and place to which every



part of the atmosphere is subject, certain states tend to perpetuate or reproduce themselves in the same region, in such manner as to maintain a constant difference in the mean or average pressures of two neighbouring regions; and that this tendency to a constant local difference is in certain cases maintained throughout those great revolutions of atmospheric density, composition, and movement which accompany the alternations of the monsoons. Nevertheless these states though protracted are not permanent, and disappear after a longer or shorter time. Sometimes suddenly, but more frequently by a graduated decrease.

When this class of phenomena first attracted my attention, my first idea was, as would probably occur to most, that the instruments used for measuring the pressure had either become defective, or had been displaced from the vertical position or moved to a different elevation, without the fact having been reported. I accordingly had the instruments recompared and ascertained by careful enquiry whether any removal had taken place, but failed to obtain any explanation of the observed anomalies. Longer experience has shewn that two or more neighbouring stations, occasionally participate in the same condition of protracted excessive or deficient pressure; and where stations exist intermediate in position between those at which extreme opposite conditions prevail, the former continue to shew an intermediate condition. I should add that, as far as regards Bengal, I have given the utmost care to ensure that all barometric observations shall be rigorously comparable, and after a careful consideration of all the circumstances, I am able to see no reason to doubt the validity of the phenomena indicated by the registers.\*

\* The most remarkable case of protracted differences of pressure, which are nevertheless not permanent, is that shewn by False Point and Cuttack, as compared with the surrounding stations. The registers shew that after remaining abnormally low throughout the year 1868, the pressure rose at the beginning of 1869 and at False Point remained unusually high throughout the years 1869, 1870, and 1871. At the beginning of 1872 it again fell, and remained relatively low during the two years following. Now at False Point the same instrument (a marine barometer of the Fitzroy pattern) was used continuously by the same observer, and, I am assured, in the same place, from the time when the station was originally established up to the end of 1872; it was then replaced by a marine barometer on the Kew principle, without any change in the general value of the readings. At Cuttack the original instrument was replaced towards the end of 1869, but the two were read simultaneously for a fortnight, and, after applying the corrections which had been previously determined in Calcutta, the readings were found to be identical. The second instrument was again replaced in December 1872 by a Casella's standard, which was

If then, as I cannot but conclude, the distribution of pressure in India is subject to protracted local variations, which nevertheless are not permanent, it seems probable that we may find herein a clue to the explanation of those irregularities of the rainfall that have so important an influence on the welfare of the people; and the connection between the two classes of phenomena must become a question of very high practical as well as scientific importance.

I have already shewn reasons why this enquiry cannot be satisfactorily undertaken at present. For instance, the establishment of an observatory at the Nicobars in May 1873, brought to light the apparent existence of a remarkable barometric depression in that neighbourhood, of which we should otherwise have remained in ignorance. What its extent may have been, we do not know, but its position is such that it must have been influential in drawing aside a portion of the monsoon current which otherwise would pass up the Bay towards Northern India. So long as we remain without information of the meteorological conditions in any part of the Indian monsoon area, we cannot be sure that the effects we witness in Northern India may not have resulted from causes whose seat lies without our area.

But although any comprehensive discussion of the subject is impossible, I may point to some observed relations between barometric depression and rainfall which are, I think, too striking to be a fortuitous coincidence. I refer more especially to the excessively heavy rainfall which occurred in the region of which the town of Hughli is the centre, in August 1868; when a very intense depression lay near Saugor Point (100 miles to the south) off the mouth of the Hughli. In the previous month of June, when the site of the minimum pressure was in the neighbourhood of False Point, the region of excessive rainfall lay about Balasore and Contai (100 miles to the north), and throughout the season, while the barometric depression held its place in the N. W. corner of the Bay, the excessive rainfall was restricted to the south-west corner of the Gangetic delta, although the fall was heavy over a considerable part of the delta. In Behar on the other hand, and in

fixed in position by myself, and a second series of simultaneous readings for a month, gave, after due correction, the same results. The instrument had been moved to a different house, I believe in 1870; but a line of levels taken at my request by the Executive Engineer of the station showed that the two positions of the instrument were appreciably at the same level. The Saugor Island barometer which in 1868 shewed as great a fall below the usual pressure as that of False Point, has been compared three times, *viz.* when first supplied to the station, again by myself on the spot at the end of 1870, and lastly with a Casella's standard supplied to the station in 1873. The results of these comparisons agreed accurately, and the instrument has always been in the same position.

the N. W. Provinces, the rainfall of this year was deficient. I may here point to a parallelism between this case and that of the rainfall in cyclones, in which it appears, by the common consent of observers, that the greatest rainfall occurs in advance of the cyclone-centre.

Now something similar to the above relation seems to be traceable in other cases when the depression is less intense and the effect more extensive. In 1873, although the fall was deficient in Bengal and the N. W. Provinces, it was not so in the Punjab nor about Roorkee and Agra, which lay to the west or north-west of the abnormal depression in Oude; that is to say, beyond the depression in the course followed by the vapour-bearing winds. It was very copious also in Burmah, which lay beyond (to the north and north-east of) the Nicobar depression, the monsoon-current here being from the south west. In 1871, when there was an abnormal depression in the east of the Bay, in Orissa, and about Jubbulpore; (how far this last may have extended east and west we do not know, in the absence of stations); the rainfall was abundant in the Gangetic valley and Bengal, as well as the Central Provinces. But on the other hand, we must not lose sight of the fact, that in 1872 and 1873, when the depression was as great or greater in the Bay of Bengal and Orissa, the rainfall in Bengal as in Northern India generally was light or very deficient. This fact warns us that we must not push too far the conclusions drawn from our present imperfect data.

The mean or normal values adopted as standards in the following tables are those of all registers up to the end of 1874. The number of years in each case is from 5 to 8. The table of these values is given at page 15 of the Meteorological Report for Bengal for the year 1874.

1868. *Table of total barometric Anomalies.*

	Calcutta.	Sagar Id.	False Pt.	Cuttack.	Chittagong.	Akyab.
January, .....	+ '024	+ '016	— '036	— '013	— '003	— '032
February, .....	+ '011	— '039	— '043	— '001	— '010	— '007
March, .....	+ '026	— '010	— '035	+ '004	+ '002	+ '005
April, .....	+ '008	— '032	— '059	— '011	+ '009	+ '018
May, .....	+ '102	+ '054	0	+ '063	+ '045	+ '072
June, .....	0	— '043	— '044	— '002	+ '035	+ '047
July, .....	+ '035	— '020	— '044	+ '004	— '001	+ '049
August, .....	— '020	— '128	— '085	— '088	— '067	— '013
September, .....	0	— '072	— '072	— '004	— '016	+ '011
October, .....	+ '034	— '021	— '013	+ '046	+ '016	+ '009
November, .....	— '014	— '049	— '059	— '010	— '034	— '068
December, .....	+ '027	+ '012	— '021	+ '020	+ '004	— '004

1868. *Table of relative barometric Anomalies.*

	Sagar Id. to Cal- cutta.	False Pt. to Cal- cutta.	Cuttack to Cal- cutta.	False Pt. to Cut- tack.	False Pt. to Akyab.	Akyab to Chitta- gong.
January, .....	— ·008	— ·060	— ·037	— ·023	— ·004	— ·029
February, .....	— ·050	— ·054	— ·012	— ·042	— ·036	+ ·003
March, .....	— ·036	— ·061	— ·022	— ·039	— ·041	+ ·003
April, .....	— ·040	— ·067	— ·019	— ·048	— ·077	+ ·009
May, .....	— ·048	— ·102	— ·039	— ·063	— ·072	+ ·027
June, .....	— ·043	— ·044	— ·002	— ·042	— ·091	+ ·012
July, .....	— ·055	— ·079	— ·031	— ·048	— ·093	+ ·050
August, .....	— ·108	— ·065	— ·068	+ ·003	— ·072	+ ·054
September, .....	— ·072	— ·072	— ·004	— ·068	— ·083	+ ·027
October, .....	— ·055	— ·047	+ ·012	— ·033	— ·022	— ·007
November, .....	— ·035	— ·045	+ ·004	— ·049	— ·009	— ·034
December, .....	— ·015	— ·048	— ·007	— ·041	— ·017	— ·008

1869. *Table of total barometric Anomalies.*

	Port Blair.	Akyab.	Chitta- gong.	Madras.	False Pt.
January, .....	+ ·101	— ·032	— ·003	+ ·038	+ ·060
February, .....	+ ·048	— ·007	— ·010	+ ·007	+ ·040
March, .....	+ ·020	— ·001	— ·010	— ·006	+ ·052
April, .....	+ ·021	+ ·018	— ·025	— ·005	+ ·040
May, .....	+ ·021	+ ·072	+ ·045	— ·010	+ ·042
June, .....	— ·011	+ ·047	— ·035	— ·034	— ·003
July, .....	+ ·002	+ ·049	— ·001	— ·019	+ ·019
August, .....	+ ·010	— ·013	— ·067	— ·013	+ ·058
September, .....	+ ·006	+ ·011	— ·016	— ·008	+ ·021
October, .....	— ·003	+ ·009	+ ·016	— ·012	+ ·014
November, .....	+ ·015	— ·068	— ·034	— ·009	+ ·048
December, .....	+ ·004	+ ·002	+ ·004	— ·056	+ ·008

	Cuttack.	Berham- pore.	Mon- ghyr.	Nagpore.	Jubbul- pore.
January, .....	+ ·052	+ ·056	+ ·039	— ·001	+ ·046
February, .....	+ ·038	+ ·016	+ ·001	— ·045	+ ·008
March, .....	+ ·039	— ·018	+ ·013	— ·049	— ·020
April, .....	+ ·021	— ·050	?	— ·034	— ·007
May, .....	+ ·019	— ·005	?	— ·049	— ·025
June, .....	— ·041	— ·151	— ·030	— ·049	— ·002
July, .....	+ ·015	— ·058	+ ·006	— ·019	+ ·011
August, .....	+ ·055	+ ·038	+ ·014	— ·010	+ ·046
September, .....	— ·005	— ·008	— ·022	— ·052	— ·036
October, .....	+ ·006	— ·011	+ ·004	— ·036	— ·058
November, .....	+ ·037	— ·011	+ ·034	+ ·018	— ·017
December, .....	+ ·025	— ·046	— ·016	— ·046	— ·032

1869. *Table of relative barometric Anomalies.*

	Akyab to Port Blair.	Akyab to Chitta- gong.	False Pt. to Mad- ras.	False Pt. to Cut- tack.	False Pt. to Ber- hampore.	Cuttack to Jubbul- pore.
January, .....	— ·133	— ·029	+ ·022	+ ·008	+ ·004	+ ·006
February, .....	— ·055	+ ·003	+ ·033	+ ·002	+ ·024	+ ·030
March, .....	— ·021	+ ·009	+ ·058	+ ·013	+ ·070	+ ·059
April, .....	— ·003	+ ·043	+ ·045	+ ·019	+ ·090	+ ·028
May, .....	+ ·051	+ ·027	+ ·052	+ ·023	+ ·047	+ ·044
June, .....	+ ·058	+ ·082	+ ·031	+ ·038	+ ·148	— ·039
July, .....	+ ·047	+ ·050	+ ·038	+ ·004	+ ·077	+ ·004
August, .....	— ·023	+ ·054	+ ·045	+ ·003	+ ·020	+ ·009
September, .....	+ ·005	+ ·027	+ ·013	+ ·026	+ ·029	+ ·031
October, .....	+ ·012	— ·007	+ ·026	+ ·008	+ ·025	+ ·064
November, .....	— ·083	— ·034	+ ·057	+ ·011	+ ·059	+ ·054
December, .....	— ·002	— ·002	+ ·064	— ·017	+ ·054	+ ·057

  

	Cuttack to Mon- ghyr.	Jubbul- pore to Nagpore.	Berham- pore to Mon- ghyr.	Berham- pore to Chitta- gong.	False Pt. to Akyab.
January, .....	+ ·013	+ ·047	+ ·017	+ ·059	+ ·092
February, .....	+ ·037	+ ·053	+ ·015	+ ·026	+ ·047
March, .....	+ ·026	+ ·029	— ·031	— ·008	+ ·053
April, .....	?	+ ·027	?	— ·025	+ ·022
May, .....	?	+ ·024	?	— ·050	— ·030
June, .....	— ·011	+ ·047	— ·121	— ·116	— ·050
July, .....	+ ·009	+ ·030	— ·064	— ·057	— ·030
August, .....	+ ·041	+ ·056	+ ·024	+ ·105	+ ·071
September, .....	+ ·017	+ ·016	+ ·014	+ ·008	— ·006
October, .....	+ ·002	— ·022	— ·015	— ·027	+ ·005
November, .....	+ ·003	— ·035	— ·045	+ ·033	+ ·116
December, .....	+ ·041	+ ·014	— ·030	— ·050	+ ·006

1870. *Table of total barometric Anomalies.*

	Port Blair.	Akyab.	Chitta- gong.	Madras.	Vizaga- patam.	False Pt.
January, .....	— ·159	?	— ·072	— ·083	— ·098	— ·010
February, .....	— ·042	— ·015	— ·042	— ·034	— ·052	+ ·029
March, .....	— ·032	— ·017	— ·050	— ·022	— ·021	+ ·017
April, .....	— ·024	— ·014	— ·038	— ·031	— ·007	+ ·019
May, .....	— ·032	— ·041	— ·014	— ·057	— ·045	— ·044
June, .....	— ·004	+ ·064	+ ·063	+ ·005	+ ·037	+ ·068
July, .....	— ·023	+ ·007	— ·020	— ·008	— ·019	— ·007
August, .....	— ·037	— ·021	— ·023	— ·007	— ·009	+ ·008
September, .....	— ·019	+ ·026	+ ·014	+ ·001	— ·007	+ ·036
October, .....	— ·006	+ ·028	— ·004	+ ·007	+ ·004	+ ·028
November, .....	— ·012	+ ·005	— ·028	+ ·008	— ·017	+ ·001
December, .....	— ·069	+ ·002	— ·009	+ ·020	+ ·013	+ ·036

1870. *Table of total barometric Anomalies.*

	Cuttack.	Berham- pore.	Mon- ghyr.	Jubbul- pore.	Nagpore.
January, .....	— ·033	— ·063	— ·028	— ·085	— ·055
February, .....	+ ·015	— ·034	— ·004	+ ·008	+ ·001
March, .....	+ ·019	— ·027	— ·003	+ ·039	+ ·004
April, .....	+ ·020	+ ·003	+ ·017	+ ·009	— ·023
May, .....	— ·052	— ·065	— ·066	+ ·013	— ·027
June, .....	+ ·038	+ ·064	+ ·024	+ ·036	+ ·037
July, .....	— ·021	— ·028	— ·032	+ ·007	— ·015
August, .....	+ ·016	— ·019	— ·003	— ·037	+ ·006
September, .....	+ ·022	— ·001	+ ·001	+ ·005	+ ·024
October, .....	+ ·006	— ·011	— ·015	— ·034	— ·003
November, .....	— ·013	— ·018	— ·024	— ·034	+ ·010
December, .....	— ·060	— ·007	— ·006	— ·003	+ ·072

1870. *Table of relative barometric Anomalies.*

	Akyab to Port Blair.	Akyab to Chitta- gong.	Vizaga- patam to Madras.	False Pt. to Viza- gapatam.	False Pt. to Cut- tack.	False Pt. to Ber- hampore.
January, .....	?	?	— ·015	+ ·088	+ ·023	+ ·053
February, .....	+ ·027	+ ·027	— ·018	+ ·081	+ ·014	+ ·063
March, .....	+ ·015	+ ·033	+ ·001	+ ·038	— ·002	+ ·044
April, .....	+ ·010	+ ·024	0	+ ·034	— ·001	+ ·016
May, .....	— ·009	— ·027	+ ·012	+ ·001	+ ·008	+ ·021
June, .....	+ ·068	+ ·001	+ ·032	+ ·031	+ ·030	+ ·004
July, .....	+ ·030	+ ·027	— ·011	+ ·011	+ ·014	+ ·021
August, .....	+ ·016	+ ·002	— ·002	+ ·017	— ·008	+ ·027
September, .....	+ ·045	+ ·012	— ·008	+ ·043	+ ·014	+ ·037
October, .....	+ ·034	+ ·012	— ·003	+ ·024	+ ·022	+ ·039
November, .....	+ ·017	+ ·033	— ·025	+ ·018	+ ·014	+ ·019
December, .....	+ ·071	+ ·011	— ·007	+ ·023	+ ·096	+ ·043

	Cuttack to Jub- bulpore.	Cuttack to Mon- ghyr.	Berham- pore to Mon- ghyr.	Berham- pore to Chitta- gong.	Jubbul- pore to Nagpore.	False Pt. to Akyab.
January, .....	+ ·052	— ·005	— ·035	+ ·009	— ·030	?
February, .....	+ ·007	+ ·019	— ·030	+ ·008	+ ·007	+ ·044
March, .....	— ·020	+ ·022	— ·024	+ ·023	+ ·035	+ ·034
April, .....	+ ·011	+ ·003	— ·014	+ ·035	+ ·032	+ ·033
May, .....	— ·065	+ ·014	+ ·001	— ·051	+ ·040	— ·003
June, .....	+ ·002	+ ·014	+ ·040	+ ·001	— ·001	+ ·004
July, .....	— ·028	+ ·011	+ ·004	— ·008	+ ·023	— ·014
August, .....	+ ·053	+ ·019	— ·016	+ ·004	— ·043	+ ·029
September, .....	+ ·017	+ ·021	— ·002	— ·015	— ·019	+ ·010
October, .....	+ ·040	+ ·021	+ ·004	— ·007	— ·031	0
November, .....	+ ·021	+ ·011	+ ·006	+ ·010	— ·044	— ·004
December, .....	— ·063	— ·054	— ·001	+ ·002	— ·075	+ ·034

1871. Table of total barometric Anomalies.

	Port Blair.	Akyab.	Chittagong.	Madras.	Vizagapatam.	False Pt.
January, .....	— '021	— '044	— '036	— '014	+ '004	0
February, .....	— '010	— '018	— '029	— '016	— '011	— '004
March, .....	?	+ '009	+ '013	+ '013	+ '012	+ '011
April, .....	?	+ '012	+ '015	+ '016	+ '007	+ '024
May, .....	?	— '007	+ '002	+ '023	+ '014	+ '021
June, .....	+ '030	— '033	— '026	— '002	— '031	— '018
July, .....	+ '016	— '010	— '015	+ '005	— '002	+ '012
August, .....	+ '022	— '003	+ '012	+ '011	+ '021	+ '026
September, .....	+ '001	— '010	+ '014	— '007	— '021	+ '010
October, .....	+ '001	— '022	— '015	+ '015	+ '015	+ '016
November, .....	+ '006	— '007	— '005	— '011	— '002	+ '013
December, .....	+ '023	+ '026	+ '035	+ '018	+ '008	+ '046

	Cuttack.	Berhampore.	Mon-ghyr.	Jubbulpore.	Nagpore.	Benares.
January, .....	— '035	— '033	— '030	+ '001	+ '059	— '018
February, .....	— '028	— '041	— '038	— '029	+ '006	— '030
March, .....	— '003	— '012	+ '009	— '005	+ '028	— '013
April, .....	— '004	+ '011	+ '020	+ '003	+ '014	+ '011
May, .....	— '010	+ '038	+ '048	+ '006	+ '066	+ '041
June, .....	— '044	— '011	— '005	— '046	— '011	— '008
July, .....	— '011	— '007	+ '008	— '016	+ '026	+ '010
August, .....	+ '010	— '011	+ '018	— '005	+ '029	+ '029
September, .....	— '034	— '022	— '006	— '060	— '008	— '030
October, .....	— '031	— '029	— '022	+ '023	+ '017	— '012
November, .....	— '045	— '042	— '035	— '032	— '043	— '021
December, .....	— '014	+ '015	+ '021	— '018	— '013	+ '016

1871. Table of relative barometric Anomalies.

	Akyab to Port Blair.	Akyab to Chittagong.	Vizagapatam to Madras.	False Pt. to Vizagapatam.	False Pt. to Cuttack.	False Pt. to Berhampore.
January, .....	— '023	— '008	+ '018	— '004	+ '035	+ '033
February, .....	— '008	+ '011	+ '005	+ '007	+ '024	+ '037
March, .....	?	— '005	— '001	— '001	+ '014	+ '023
April, .....	?	— '003	— '009	+ '017	+ '028	+ '013
May, .....	?	— '009	— '009	+ '007	+ '031	— '017
June, .....	— '063	— '007	— '029	+ '013	+ '026	— '007
July, .....	— '026	+ '005	— '007	+ '014	+ '023	+ '019
August, .....	— '025	— '015	+ '010	+ '005	+ '016	+ '037
September, .....	— '011	— '024	— '014	+ '031	+ '044	+ '032
October, .....	— '023	— '006	0	+ '001	+ '047	+ '045
November, .....	— '013	— '002	+ '009	+ '015	+ '058	+ '055
December, .....	+ '003	— '009	— '010	+ '038	+ '060	+ '031

1871. Table of relative barometric Anomalies.

	False Pt. to Akyab.	Cuttack to Jub- bulpore.	Cuttack to Mon- ghyr.	Berham- to Mon- ghyr.	Berham- pore to Chitta- gong.	Jubbul- pore to Nagpore.	Jubbul- pore to Benares.
January, .....	+ '044	— '036	— '005	— '003	+ '003	— '058	+ '019
February, .....	+ '014	+ '001	+ '010	— '003	— '012	— '035	+ '011
March, .....	+ '002	+ '002	— '012	— '021	— '025	— '033	+ '008
April, .....	+ '012	— '007	— '024	— '009	— '004	— '011	— '008
May, .....	+ '028	— '016	— '058	— '010	+ '036	— '060	— '035
June, .....	+ '015	+ '002	— '039	— '006	+ '015	— '035	— '038
July, .....	+ '022	+ '005	— '019	— '015	+ '008	— '042	— '026
August, .....	+ '029	+ '015	— '008	— '029	— '023	— '034	— '034
September, .....	+ '020	+ '026	— '028	— '016	— '036	— '052	— '030
October, .....	+ '038	— '056	— '009	— '007	— '014	+ '006	+ '035
November, .....	+ '020	— '013	— '010	— '007	— '037	+ '011	— '011
December, .....	+ '020	+ '004	— '035	— '006	— '020	— '005	— '034

1872. Table of total barometric Anomalies.

	Port Blair.	Akyab.	Chitta- gong.	Mad- ras.	Vizaga- patam.	False Pt.	Cuttack.	Berham- pore.
January, .....	+ '028	+ '014	+ '027	+ '013	+ '035	+ '015	— '022	+ '028
February, .....	+ '011	+ '020	+ '033	+ '008	+ '016	— '004	— '013	+ '029
March, .....	+ '022	+ '002	+ '007	+ '008	— '005	— '030	— '026	— '008
April, .....	— '016	— '023	— '001	+ '008	0	— '011	— '001	+ '012
May, .....	— '007	— '019	+ '002	— '016	— '006	— '031	— '011	+ '015
June, .....	— '019	— '003	+ '026	+ '010	+ '010	— '041	— '036	+ '047
July, .....	— '012	— '008	+ '025	+ '005	+ '013	— '020	— '018	+ '033
August, .....	— '026	— '026	— '005	— '018	— '030	— '050	— '040	— '011
September, .....	— '011	— '011	+ '040	+ '006	+ '016	+ '023	+ '020	+ '039
October, .....	— '024	— '010	+ '002	— '008	— '011	— '019	— '032	+ '012
November, .....	— '038	— '045	— '038	— '039	— '029	— '041	— '045	— '016
December, .....	— '024	— '059	— '046	— '034	— '041	— '052	— '065	— '041

	Mon- ghyr.	Jubbul- pore.	Nagpore.	Benares.	Jhansi.	Agra.	Luck- now.
January, .....	+ '027	+ '006	— '001	+ '018	— '015	+ '017	+ '014
February, .....	+ '024	+ '021	— '003	+ '018	— '018	— '004	+ '027
March, .....	— '008	+ '006	+ '007	— '005	+ '017	— '012	+ '005
April, .....	+ '001	+ '014	+ '019	+ '012	— '001	— '022	+ '011
May, .....	+ '002	— '020	+ '001	— '001	+ '011	— '026	+ '015
June, .....	+ '024	+ '009	+ '010	+ '020	+ '033	— '001	+ '032
July, .....	+ '022	+ '001	+ '010	+ '012	+ '036	+ '001	+ '030
August, .....	— '016	— '032	— '038	— '021	— '016	— '023	— '024
September, .....	+ '038	+ '040	+ '024	+ '040	+ '042	+ '033	?
October, .....	+ '008	+ '018	+ '031	+ '006	— '024	+ '002	?
November, .....	— '022	— '019	— '031	— '017	— '047	— '039	?
December, .....	— '035	— '025	— '048	— '040	— '038	— '052	— '054



1872. Table of relative barometric Anomalies.

	Akyab to Port Blair.	Akyab to Chitta- gong	Viza- gapatam to Madras.	False Pt. to Viza- gapatam	False Pt. to Cut- tack.	False Pt. to Ber- hampore.	False Pt. to Akyab.	Cuttack to Jub- bulpore.
January, . . . . .	-.014	-.013	+ .022	-.020	+ .037	-.013	+ .001	-.028
February, . . . . .	+ .009	-.013	+ .008	-.020	+ .009	-.033	-.024	-.034
March, . . . . .	-.020	-.005	-.013	-.025	-.004	-.022	-.032	-.032
April, . . . . .	-.007	-.022	-.008	-.011	-.010	-.023	+ .012	-.015
May, . . . . .	-.012	-.021	+ .010	-.025	-.020	-.046	-.012	+ .009
June, . . . . .	+ .016	-.029	0	-.051	-.005	-.088	-.038	-.045
July, . . . . .	+ .004	-.033	+ .008	-.033	-.002	-.053	-.012	-.019
August, . . . . .	0	-.021	-.012	-.020	-.010	-.039	-.024	-.008
September, . . . . .	+ .022	-.029	+ .010	+ .007	+ .003	-.016	+ .012	-.020
October, . . . . .	+ .014	-.012	-.003	-.008	+ .013	-.031	-.009	-.050
November, . . . . .	-.007	-.007	+ .010	-.012	+ .004	-.025	+ .004	-.026
December, . . . . .	-.035	-.013	-.007	-.011	+ .013	-.011	+ .007	-.040

	Cuttack to Ber- hampore.	Cuttack to Mon- ghyr.	Berham- pore to Mon- ghyr.	Berham- pore to Chitta- gong.	Jubbul- pore to Nagpore.	Jubbul- pore to Benares.
January, . . . . .	-.050	-.049	+ .001	+ .001	+ .007	-.012
February, . . . . .	-.042	-.037	+ .005	-.004	+ .024	+ .003
March, . . . . .	-.018	-.018	0	-.015	-.001	+ .011
April, . . . . .	-.013	-.002	+ .011	+ .011	-.005	+ .002
May, . . . . .	-.026	-.013	+ .013	+ .013	-.021	-.019
June, . . . . .	-.083	-.060	+ .023	+ .021	-.001	-.011
July, . . . . .	-.051	-.040	+ .011	+ .008	-.009	-.011
August, . . . . .	-.029	-.024	+ .005	-.006	+ .006	-.011
September, . . . . .	-.019	-.018	+ .001	-.001	+ .016	0
October, . . . . .	-.044	-.040	+ .004	+ .010	+ .017	+ .012
November, . . . . .	-.029	-.023	+ .006	+ .012	+ .012	-.002
December, . . . . .	-.024	-.030	+ .006	+ .005	+ .023	+ .015

	Jubbul- pore to Jhansi.	Jubbul- pore to Agra.	Lucknow to Agra.	Lucknow to Jhansi.
January, . . . . .	+ .021	-.011	-.003	+ .029
February, . . . . .	+ .039	+ .025	+ .031	+ .045
March, . . . . .	-.011	+ .018	+ .017	-.012
April, . . . . .	+ .015	+ .036	+ .033	+ .012
May, . . . . .	-.031	+ .006	+ .041	+ .004
June, . . . . .	-.024	+ .010	+ .033	-.001
July, . . . . .	-.035	0	+ .029	-.006
August, . . . . .	-.016	-.009	-.001	-.006
September, . . . . .	-.002	+ .007	?	?
October, . . . . .	+ .042	+ .016	?	?
November, . . . . .	+ .028	+ .020	?	?
December, . . . . .	+ .013	+ .027	-.002	-.016

1873. *Table of total barometric Anomalies.*

	Port Blair.	Akyab.	Chittagong.	Madras.	Vizagapatam.	False Pt.	Cuttack.	Berhampore.
January, .....	-.010	-.051	-.026	-.005	-.008	-.052	-.061	-.045
February, ....	-.019	-.011	+ .004	+ .005	+ .020	-.004	-.006	-.004
March, .....	+ .002	-.002	+ .032	+ .016	+ .020	-.013	-.004	+ .011
April, .....	-.005	-.025	+ .010	-.018	-.025	-.045	-.029	-.016
May, .....	+ .020	-.015	+ .035	+ .037	+ .053	+ .009	+ .021	+ .041
June, .....	-.030	-.058	-.023	-.010	-.035	-.059	-.066	-.031
July, .....	-.023	-.063	-.033	-.003	-.007	-.073	-.076	-.054
August, .....	-.003	+ .014	+ .056	+ .008	+ .021	-.003	-.005	+ .038
September, ....	+ .001	-.018	+ .020	+ .024	+ .008	-.025	-.040	-.017
October, .....	-.012	-.005	+ .028	-.006	+ .017	+ .004	-.021	+ .018
November, ....	+ .022	+ .028	+ .056	+ .033	+ .043	+ .030	+ .004	+ .042
December, ....	+ .031	0	+ .016	+ .005	-.008	-.009	-.030	+ .009

	Mon-ghyr.	Jubbulpore.	Nagpore.	Benares.	Jhansi.	Agra.	Lucknow.
January, .....	-.038	-.007	-.024	-.049	-.053	-.068	-.061
February, .....	0	+ .005	-.011	-.001	+ .005	-.017	-.011
March, .....	+ .013	+ .006	+ .004	-.012	+ .012	-.028	-.011
April, .....	-.030	-.019	-.006	-.038	-.021	-.057	-.056
May, .....	+ .028	+ .028	+ .048	+ .038	+ .049	+ .044	+ .040
June, .....	-.050	-.034	-.011	-.053	-.018	-.059	-.076
July, .....	-.056	-.026	-.021	-.049	-.019	-.047	-.065
August, .....	+ .029	+ .024	+ .010	?	+ .035	+ .023	+ .009
September, .....	-.021	0	+ .009	?	-.011	-.015	-.037
October, .....	+ .011	+ .033	+ .027	?	+ .026	+ .017	+ .012
November, .....	+ .035	+ .040	+ .022	?	+ .043	+ .033	+ .028
December, .....	-.008	+ .022	+ .002	?	+ .005	-.003	-.011

1873. *Table of relative barometric Anomalies.*

	Akyab to Port Blair.	Akyab to Chittagong.	Vizagapatam to Madras.	False Pt. to Vizagapatam.	False Pt. to Cuttack.	False Pt. to Berhampore.
January, .....	-.041	-.025	-.003	-.044	+ .009	-.007
February, .....	+ .008	-.015	+ .015	-.024	+ .002	0
March, .....	-.004	-.034	+ .004	-.033	-.009	-.024
April, .....	-.020	-.035	-.007	-.020	-.016	-.029
May, .....	-.035	-.050	-.016	-.044	-.012	-.032
June, .....	-.028	-.035	-.025	-.024	+ .007	-.028
July, .....	-.040	-.030	-.004	-.064	+ .003	-.019
August, .....	+ .017	-.042	+ .013	-.024	+ .002	-.041
September, .....	-.019	-.038	-.016	-.033	+ .015	-.008
October, .....	+ .007	-.033	+ .023	-.013	+ .025	-.014
November, .....	+ .006	-.028	+ .010	-.013	+ .026	-.012
December, .....	-.031	-.016	-.013	-.001	+ .021	-.018

1873. Table of relative barometric Anomalies.

	False Pt. to Akyab.	Cuttack to Jubbul- pore.	Cuttack to Ber- hampore.	Cuttack to Mon- ghyr.	Berham- pore to Mon- ghyr.	Berham- pore to Chitta- gong.
January, .....	— '001	— '054	— '016	— '023	— '007	— '019
February, .....	+ '007	— '011	— '002	— '006	— '004	— '008
March, .....	— '011	— '010	— '015	— '017	— '002	— '021
April, .....	— '020	— '010	— '013	+ '001	+ '014	— '026
May, .....	+ '024	— '007	— '020	— '007	+ '013	+ '006
June, .....	— '001	— '032	— '035	— '016	+ '019	— '008
July, .....	— '010	— '050	— '022	+ '020	+ '002	— '021
August, .....	— '017	— '029	— '043	— '034	+ '009	— '018
September, .....	— '007	— '040	— '023	— '019	+ '004	— '037
October, .....	+ '009	— '054	— '039	— '032	+ '007	— '010
November, .....	+ '002	— '036	— '038	— '031	+ '007	— '014
December, .....	— '009	— '052	— '039	— '022	+ '017	— '007

  

	Jubbul- pore to Nagpore.	Jubbul- pore to Benares.	Jubbul- pore to Jhansi.	Jubbul- pore to Agra.	Lucknow to Agra.	Lucknow to Jhansi.
January, .....	+ '017	+ '042	+ '046	+ '061	+ '007	— '008
February, .....	+ '016	+ '006	0	+ '022	+ '006	— '016
March, .....	+ '002	+ '018	— '006	+ '034	+ '017	— '023
April, .....	— '013	+ '019	+ '002	+ '038	+ '001	— '035
May, .....	— '020	— '010	— '021	+ '016	— '004	— '009
June, .....	— '023	+ '019	— '016	+ '025	— '017	— '058
July, .....	— '005	+ '023	— '007	+ '021	— '018	— '046
August, .....	+ '014	?	— '011	+ '001	— '014	— '026
September, .....	— '009	?	+ '011	+ '015	— '022	— '026
October, .....	+ '006	?	+ '007	+ '016	— '005	— '014
November, .....	+ '018	?	— '003	+ '007	— '005	— '015
December, .....	+ '020	?	+ '017	+ '025	— '008	— '016

1874. Table of total barometric Anomalies.

	Port Blair.	Akyab.	Chitta- gong.	Mad- ras.	Vizaga- patam.	False Pt.	Cut- tack.	Berham- pore.
January, .....	+ '062	+ '037	+ '060	+ '047	+ '065	+ '037	+ '010	+ '041
February, .....	+ '013	+ '030	+ '055	+ '016	+ '029	+ '011	— '004	+ '021
March, .....	— '010	— '016	+ '022	— '019	— '004	— '027	— '028	— '012
April, .....	+ '025	+ '023	+ '052	+ '030	+ '024	— '004	— '003	+ '015
May, .....	— '002	— '033	— '004	— '032	— '014	— '057	— '049	— '046
June, .....	+ '002	+ '014	+ '055	+ '022	+ '011	+ '001	— '006	+ '069
July, .....	— '004	+ '005	+ '049	+ '001	+ '016	+ '005	— '008	+ '069
August, .....	+ '013	— '009	+ '010	+ '008	— '001	— '032	— '043	— '005
September, .....	— '008	+ '007	+ '035	— '026	+ '006	+ '015	— '014	+ '017
October, .....	+ '004	— '015	— '005	— '022	— '024	— '041	— '075	— '026
November, .....	— '018	+ '007	+ '015	+ '011	+ '005	— '003	— '027	+ '022
December, .....	— '040	+ '002	+ '026	+ '016	+ '027	+ '021	— '006	+ '031

1874. Table of total barometric Anomalies.

	Mon- ghyr.	Jubbul- pore.	Nagpore.	Benares.	Jhansi.	Agra.	Luck- now.
January, .....	+ '032	+ '039	+ '025	+ '002	+ '030	+ '010	— '001
February, .....	+ '015	— '015	— '004	— '009	— '009	— '008	— '020
March, .....	— '021	— '028	+ '007	— '026	— '020	— '042	— '055
April, .....	— '005	— '002	+ '030	— '022	+ '016	— '002	— '014
May, .....	— '080	?	— '033	— '094	— '028	— '056	— '089
June, .....	+ '036	+ '040	+ '023	+ '020	+ '032	+ '023	+ '021
July, .....	+ '048	+ '022	+ '016	+ '019	+ '035	+ '015	+ '021
August, .....	— '010	+ '004	+ '003	?	— '008	— '018	— '022
September, .....	+ '015	+ '053	+ '006	?	+ '010	— '012	— '011
October, .....	— '023	+ '011	— '018	?	— '018	— '043	— '031
November, .....	+ '024	+ '039	+ '025	?	+ '016	— '003	+ '002
December, .....	+ '023	+ '058	+ '032	?	?	+ '003	— '002

1874. Table of relative barometric Anomalies.

	Akyab to Port Blair.	Akyab to Chitta- gong.	Vizaga- patam to Madras.	False Pt. to Viza- gapatam.	False Pt. to Cut- tack.	False Pt. to Ber- hampore.
January, .....	— '025	— '023	+ '018	— '028	+ '027	— '004
February, .....	+ '027	— '025	+ '013	— '018	+ '015	— '010
March, .....	— '006	— '038	+ '015	— '023	+ '001	— '015
April, .....	— '002	— '029	— '006	— '028	— '001	— '019
May, .....	— '031	— '029	+ '018	— '043	— '012	— '011
June, .....	+ '012	— '041	— '011	— '010	+ '007	— '068
July, .....	+ '009	— '044	+ '015	— '011	+ '013	— '064
August, .....	— '022	— '019	— '009	— '031	+ '011	— '027
September, .....	+ '015	— '028	+ '032	+ '009	+ '029	— '002
October, .....	— '019	— '010	— '002	— '017	+ '034	— '015
November, .....	+ '025	+ '008	— '006	— '008	+ '024	— '025
December, .....	+ '042	— '024	+ '011	+ '006	+ '027	— '010

	False Pt. to Akyab.	Cuttack to Jub- bulpore.	Cuttack to Ber- hampore.	Cuttack to Mon- ghyr.	Berham- pore to Mon- ghyr.	Berham- pore to Chitta- gong.
January, .....	0	— '029	— '031	— '022	+ '009	— '019
February, .....	— '019	+ '011	— '025	— '019	+ '006	— '034
March, .....	— '011	0	— '016	— '007	+ '009	— '033
April, .....	— '027	— '001	— '018	+ '002	+ '020	— '037
May, .....	— '024	?	— '003	+ '031	+ '034	— '042
June, .....	— '013	— '046	— '075	— '042	+ '033	+ '014
July, .....	0	— '030	— '077	— '056	+ '021	+ '020
August, .....	— '023	— '047	— '038	— '033	+ '005	— '015
September, .....	+ '008	— '068	— '031	— '029	+ '002	— '018
October, .....	— '026	— '086	— '049	— '052	— '003	— '021
November, .....	— '010	— '066	— '049	— '051	— '002	+ '007
December, .....	+ '019	— '064	— '037	— '029	+ '008	+ '005

1874. *Table of relative barometric Anomalies.*

	Jubbulpore to Nagpore.	Jubbulpore to Benares.	Jubbulpore to Jhansi.	Jubbulpore to Agra.	Lucknow to Agra.	Lucknow to Jhansi.
January, .....	+ '014	+ '037	+ '009	+ '029	— '011	— '031
February, .....	— '011	— '006	— '006	— '007	— '012	— '011
March, .....	— '035	— '002	— '008	+ '014	— '013	— '035
April, .....	— '032	+ '020	— '018	0	— '012	— '030
May, .....	?	?	?	?	— '033	— '061
June, .....	+ '017	+ '020	+ '008	+ '017	— '002	— '011
July, .....	+ '006	+ '003	— '013	+ '007	+ '006	— '014
August, .....	+ '001	?	+ '012	+ '022	— '004	— '014
September, .....	+ '047	?	+ '043	+ '065	+ '001	— '021
October, .....	+ '029	?	+ '029	+ '054	+ '012	— '013
November, .....	+ '014	?	+ '013	+ '042	+ '005	— '014
December, .....	+ '026	?	?	+ '055	— '005	?

IV.—*Description of a new Species of Phasmidæ.*—

By JAMES WOOD-MASON.

(Recd. April 20th ;—Read May 3rd, 1876.)

(With Plate XI).

LONCHODES VERRUCIFER.

♂ ♀. Head armed between the middle of the eyes with two forwardly curved conical horns, connected by a slight transverse elevation, and with the hinder margin divided by notches into four or five tubercles. Antennæ long and setaceous. Mesosternum longitudinally carinate. The upper surface of thorax and abdomen traversed by a fine raised longitudinal line, sharper and finer in the female. The mesothorax moderately dilated at the insertion of the legs. Legs weak ; all the femora have two minute spinules placed close together in the same straight line near the apex below, and the four posterior ones slightly widen from the proximal to the distal end, but neither pair is thickened ; upper edge of the tibiæ and the first tarsal joint of fore-legs elevated into a sharp foliaceous crest, these parts being simple in the rest of the legs.

♂. Body quite smooth. The abdomen is uniform in width or tapers to an almost imperceptible extent from its base to the apex of the 6th segment ; the 7th dorsal segment is dilated, the 8th, which is slightly swollen, narrowed, from base to apex, both are obtusely carinate ; the strongly carinate basal half of the 9th is divided by a linear slit into two parts connected by